

**Appendix C**  
**ASTM Classifications and SCS Soil Description**

**Appendix C-1**  
**ASTM Classifications**

Appendix C. Soil Lithology and ASTM Classifications					
Location	General Description	Shallow (2" to 10" bgs)		Deep (2' to 3' bgs)	
		ASTM Code	Description	ASTM Code	Description
BGS-A1-01	Relocated 180' SW to stay off private property.	SW	Well graded sand w/gravel (<10%), mod compacted/cemented.	SW	Well graded sand w/gravel (15-20%), fine-med gravel 1/2-1" rhyolite rock.
BGS-A1-02	Coarse gravel in silty sand matrix. Calcite coating on gravel but not a distinct caliche layer in mix.	SW	Well graded silty sand w/some gravel to 8", coarse gravel starts at 8".	GW	Coarse gravel 1-5" sub-rounded (80% gravel) in silty sand matrix, calcite coating on gravel surface.
BGS-A1-03		SW	Well graded sand w/minor gravel, hard, well cemented, reddish brown color.	GW	Med-coarse gravel in sand matrix, not compacted. Gravel (~40%), sand (~60%). Gravel rock is crystal rich rhyolite w/biotite, feldspar, quartz crystals.
BGS-A1-04	Location 700-1000' down slope from firing range/bow range and haul road.	SW-SM	Hard, compacted, mod-well graded silty sand w/gravel.	SW	Mod-well graded, fine-med sand w/gravel and cobbles/boulders (to 20"). ~20% gravel/rock. Softer, less compacted. Rocks composed of rhyolite volcanics.
BGS-A1-05	Location is far down alluvial fan, next to identified archeology site. Repositioned sample location ~ 150' east to remain outside marked archeological site boundary. Soil is very sandy, minor gravel, loose. 0-6" bgs loose dry surface soil w/organics. 6-8" bgs wk-mod cemented, mod firm silty sand. 18-36" bgs loose mod-poorly graded sand w/minor gravel.	SP	Mod graded silty sand, mod firm/cemented, no caliche. Reddish brown soil.	SP	Mod-poorly graded sand w/fine-coarse sand, minor gravel (<10%) up to 1/2". Very loose, reddish brown. No caliche.
BGS-A1-06	Mod-poorly graded fine-med sand, well cemented from 4-24" w/caliche filling in root casts. Some gravel lenses at 20-30" in localized areas of excavation, but not continuous horizon.	SP	Poorly graded fine-med sand w/minor gravel. Caliche zone, mod-well cemented, firm.	SP	Mod-poorly graded sand w/minor gravel, not much caliche at this depth, mod firm, reddish brown. Gravel pieces are crystalline volcanic (rhyolite?).
BGS-A1-07	Adjust position to ~100' west of planned location to stay off private property.	SW	Silty sand w/minor gravel. Organic horizon at 0-7", compacted soil; less organic material at 7-10".	SW	Silty sand w/minor gravel, hard compacted soil. Roots visible at 3'.

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BGS-A1-08	Adjust position to ~100' west of planned location to stay off private property.	SW	Silty sand w/minor gravel and organic roots, no clay, med-dark brown, very little moisture. Organic horizon 0-8"	SP	Sand, fine-medium, poorly graded w/ minor silt (less than shallow) and minor gravel to 1/2".
BGS-A1-09	Very sandy location near foothills of mountains.	SP	Fine-med, poorly graded sand w/minor gravel to 1/2".	SP	Fine-med, poorly graded sand w/ mod. gravel to 1/2", gravel, <5% silt, 80% sand, 15% gravel.
BGS-A1-10		SP	Fine-med sand, poorly graded, uncompacted, little-no gravel.	SW	Med-coarse gravel lens from 24-26", sand w/ med gravel from 26-36", well graded. Sample collected primarily from 26-36" sand interval
BGS-A1-11		SP	Poorly graded sand (fine-med) w/minor silt and gravel to 1". Organic horizon from 0-8" is not well defined. Dry, some roots.	SP	Poorly graded sand (med) with some gravel from 1/8" to 1", rounded to sub-angular. Moderately compacted but breaks w/impact
BGS-A1-12		SP	Fine-med sand w/little silt, minor gravel, some roots.	SW	Fine-med sand, well graded, no silt. Gravel horizon at 2-2.5' interval w/coarse angular gravel to 2".
BGS-A1-13	Well graded sand from 0-30" bgs, gravel/sand mixture from 30-40" bgs w/angular gravel to 3" diam. Plant roots to 30" bgs	SW	Silt to med sand, well graded w/trace angular gravel (5%) to 1/2", dense, light brown, dry.	SW	Silty to med sand, well graded w/angular gravel (30%) to 3" diameter, med dense, med brown, dry.
BGS-A1-14	Location is far down alluvial fan, less gravel, more silt and sand. Soil is generally pretty loose, uncemented. Distinct caliche zone at 24-30" bgs, small gravel lenses at 12-18" bgs and 36"+ bgs.	SW	Well graded silty-sand w/little-no gravel, weakly cemented, mod firm, reddish-yellow brown.	SW	Well graded silty sand w/minor gravel in small lenses. 6" of caliche at 24-30" mos. Firm but not too hard, reddish brown.
BGS-A1-15	Generally silty to med sand w/trace angular gravel, brown, dry. Angular gravel layer from 16" bgs to 36" bgs. Plant roots from 0" to 36" bgs	SW and SP	Silty to fine sand, well graded and poorly graded silty sand, trace angular gravel to 1/2" (10%), very dense, dry, reddish brown.	GW	Sand and gravel mixture (50-50), well graded w/angular gravel to 2", dense, dry, light brown

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BGS-A1-16	Generally very sandy soil w/gravel lenses.	SP	Loose unconsolidated sand (fine-coarse), moderate graded, w/minor gravel (5-10%)	SP	Loose, mod graded sand w/fine-med gravel lenses (0.5-2").
BGS-A1-17	Generally coarse gravelly soil with silty sand matrix. 80% gravel sized 1/2-4".	GW	Well graded gravel (~50%) in silty sand matrix.	GP	Coarse gravel lens from 28-38" bgs with cobbles up to 4". Caliche in matrix.
BGS-A1-18	Med-coarse gravel in well graded matrix, not a clearly defined gravel horizon but just a jumble. Some caliche in matrix starting at 16".	GW	Well graded gravel in silty sand matrix.	GW	Coarse gravel and cobbles to 4", rhyolite, in silty sand matrix.
BGS-A1-19	Location 20' north of cat scrape prospect pit.	SW	Well graded sand, fine and coarse sand w/some gravel.	SW	Well graded sand w/ gravel to 2" in fine sandy matrix. Caliche layer at 34".
BGS-A1-20	Location between haul road and mine. Soil very rocky w/ up to 12" boulders. Soil smells musty, possibly high in organic content.	GW	Well graded sandy gravel, full range of particle size from fine to gravel. Organic rich.	GW	Well graded gravel, same as shallow but more gravel. Caliche appears at 36" (not included in sample).
BGS-A1-21	Generally silty to med sand w/trace angular gravel, med brown, dry, dense.	SW	Silty to fine sand, well graded w/trace gravel to 1/2" (10%), very dense, reddish brown, dry.	SW	Fine to med sand, well graded w/trace gravel to 2" (20%), med dense, brown, dry.
BGS-A1-22	Generally gravel in sandy matrix entire 3". Some horizontal bedded gravel lenses starting at 2.5' bgs.	GW	Poorly sorted, well graded gravel in silty sand matrix, gravel to 2" (40%)	GW	Med gravel to 2" in lenses, subrounded (60%), brown.
BGS-A1-23	Generally very gravelly in sand matrix med gravel to 2" dia.	GW	Well graded gravel to 2" diameter in sandy matrix. 60% gravel, 40% sand matrix.	GW	Very well graded, med sized gravel to 2", sub-rounded. 60-70% gravel in silt/sand matrix.
BGS-A1-24	Location ~50-80' downhill from cat scrape prospect pit.	SP-SM	Dense sand, compacted, cemented, hard. Sand (75%) w/fine sand/silt and minor large gravel/cobble to ~12". Sandy loam.	SW	Looser sand w/ some fines and some gravel. Sand (60%), silt (<10%), gravel (15%).
BGS-A1-25		SW-SM	Well graded silty sand w/ some gravel. Silt (25%), fine-med sand (50%).	GW	Med-coarse gravel (1/2-3") in silty sand matrix. Caliche coating on gravel and in matrix. Gravel (85%) matrix (15%)

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Location	General Description	Shallow (2" to 10" bgs)		Deep (2' to 3' bgs)	
		ASTM Code	Description	ASTM Code	Description
BGS-A1-26	Generally silty to fine sand w/ trace igneous rock. Plant root to 10" bgs.	SP	Poorly graded silty sand w/trace volcanic gravel to 2" (10%), med dense, med dark brown.	SW	Well graded silty to coarse sand w/trace volcanic gravel (10%), dense, reddish brown, dry.
BGS-A1-27	Adjacent to mine fence near Tibbals waste incinerator. Gravel lens from 0-2' bgs.	GW	Well graded sandy gravel w/silt. Gravel lens from 1/2"-3" in silt/sand matrix. Very rocky and hard packed, reddish brown soil.	SP	Mod-poorly graded sand w/ gravel ¼-1"
BGS-A1-28	Generally san and gravel mixture w/angular gravel from ½-2", loose to med density. Less gravel in top foot.	SW	Silty to med sand, well graded w/trace coarse sand, organic content, no gravel, reddish brown, very dense, dry.	GP	Large angular gravel and thin layers of caliche w/fine to med sand (40%) loose, dry.
BGS-A1-29	Generally, sand w/gravel to 1" dia. Igneous rock. Plant roots to 12" bgs.	SW	Silty to fine sand, well graded w/trace gravel to ½" (igneous), dense, reddish brown, dry.	GP	Angular gravel, thin layers of caliche w/fine to med sand (40%), med dense, dry.
BGS-A1-30	Location in small, dry drainage ditch ~50-80' uphill from cat scrape exploration pit.	GP	Med-coarse gravel 1/2-3" (80%) in silty sand matrix. Rock is unalt. rhyolite	GP	Med-coarse gravel (80%) in silty sand matrix w/ minor caliche.
BGS-A1-31	Location ~100' downhill from cat scrape exploration pit.	SW	Well graded silt (15%), sand (40%) and gravel (40%).	GP	Coarse gravel (80%) w/sand and silt matrix. White caliche in soil matrix and coating on gravel. Gravel made up of rhyolite volcanic w/quartz and, feldspar crystals.
BGS-A1-32		SP	Very sandy, fine-med sand, no silt, minor gravel < 10%, size <1/2". Very loose, unconsolidated, poorly graded.	SP	Very poorly graded med sand w/ 15-20% gravel. Poorly cemented discontinuous caliche layers at 2-3'.
BGS-A1-33	Generally sand and gravel mixture w/gravel to 2" dia., caliche type rock, plant roots to 20" bgs.	SW	Silty to fine sand, well graded w/little coarse sand (15%) and trace gravel (5%) to 1" dia. Loose, reddish brown, dry.	GP	Angular gravel and caliche w/fine to coarse sand (30%), dense, dry, med brown.
BGS-A1-34	Generally sand and gravel mixture with caliche layers, gravel to 2" (igneous).	SW	Silty to fine sand, well graded, w/trace angular gravel, very dense reddish brown, dry.	GP	Gravel and caliche, angular to 3" w/some silty to med sand, med density, med brown, dry.
BGS-A1-35	Generally, sand and gravel mixture w/ 4" organic topsoil in pockets, plant roots to 5" bgs.	SP	Poorly graded silty sand and sandy silt w/trace gravel angular (5%), loose, dark brown, dry.	SW	Well graded silty to coarse sand w/angular pebbles and gravel from ¼" to 4" dia, loose, med brown, dry.

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BGS-A1-36	Generally, sand and large angular gravel mixture w/plant roots to 36" bgs.	GW	Angular gravel from ½" to 6" w/poorly graded sand-silty (50/50), loose, med brown, dry.	SW	Well graded silty to coarse sand w/angular pebbles and gravel (20%) from ¼-2", loose, med brown, dry.
BGS-A1-37	Sample location was on a steep slope, relocated ~150' south for safety. Generally, sand and gravel mixture w/silt near top 0-10" bgs and increasing sand at depth. Color darker from 2-3' bgs w/ organic material. Plant roots at 2.5' bgs.	SW/GW	Well graded silty to coarse sand and well graded, porous volcanic gravel from ½ to 1" dia w/pebbles, loose, dark brown, dry.	SW	Well graded fine to coarse sand and pebbles w/some angular gravel (25%), dense, various color sand and pebbles, gray and white rock, dry.
BGS-A2-38	Generally, sand from 0-12" bgs, sand/gravel from 12-40" bgs, plant roots to 36" bgs.	SP	Poorly graded silty sand w/trace angular gravel to ½" (5%), loose dark brown, dry.	SW	Well graded silty to med sand w/angular gravel to 3" dia (30%), loose, med brown, dry.
BGS-A2-39	Generally sand and gravel mixture-granite gravel, angular. Silty sand in top foot, fine to med sand below. Plant roots to 3' bgs.	SP	Poorly graded silty sand w/angular granite gravel (25%) to 2" dia, loose, reddish brown.	GP	Angular gravel and igneous rock/gravel and fine to med, well sorted sand (50-50), gravel to 4" dia, loose, med- brown, dry.
BGS-A2-40	Generally, sand and gravel mixture, angular gravel to 3" dia. Plant roots to 36" bgs.	SP	Poorly graded silty sand w/ angular gravel to 2" dia (10%), loose, reddish brown, dry.	SW	Well graded silty to med sand w/angular gravel to 2" dia (30%), loose, med brown, dry.
BGS-A2-41	Generally, sand and gravel mixture w/increasing gravel at depth and gravel layer at 3' bgs, plant roots to 2.5' bgs.	SP	Silty sand, poorly graded w/trace angular gravel (50%) to ½" dia, loose, light brown, dry.	GW	Angular gravel, well graded from ½ to 2" w/pebbles and well graded fine to med sand (40%), loose, med brown, dry.
BGS-A2-42	Generally sand w/little gravel from 0" to 2' bgs and gravel w/some sand from 2'-3.5' bgs Plant roots to 2.5' bgs.	SW	Well graded silty to coarse sand w/trace angular gravel (5%) to ½" dia, loose, med brown, dry.	GW	Well graded silty to coarse sand (30%) and well graded gravel from ½ to 2" angular w/pebbles, loose, med brown, dry. Note: Observed pockets and layers of red-brown (iron stained?) sand and gravel.
BGS-A2-43	Generally, silty sand and silt from 0-8" bgs, sand and gravel mixture from 8"-1.5' bgs, mostly gravel w/some sand from 1.5 to 3.5' bgs, plant roots to 3' bgs.	SP	Silty sand, poorly graded w/trace gravel (5%) angular to ½" dia, med dense, dark brown (organic material?), dry.	GW	Angular gravel, well graded from ½ to 2" dia w/pebbles and some fine to med sand (20%), med dense, med brown, dry.

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		ASTM Code	Description	ASTM Code	Description
BGS-A2-44	Generally, silty sand and silt from 0-1' bgs and sand and gravel mixture from 2-3' bgs, plant roots 2' bgs.	SP	Silty, poorly graded sand w/trace angular gravel (5%) to ½" dia, med dense, med brown, dry.	SW	Well graded silty to coarse sand w/ pebbles and some angular gravel (20%) from ½ to 2" dia, loose, multi-colored, dry.
BGS-A2-45	Generally, sand throughout profile w/small pockets of caliche and some gravel, plant roots 3' bgs.	SP	Poorly graded silty sand w/trace angular gravel (10%), med dense, reddish brown, dry.	SP/GP	Poorly graded silty sand w/angular gravel (40%) and some coarse sand (10%), loose, reddish brown, dry
BGS-A2-46	Generally, relatively homogeneous silty fine sand top to bottom w/no gravel and decreasing density w/depth. Caliche layer starting at 3' bgs, solid and very dense, plant roots to 3' bgs.	SP	Silty sand, poorly graded, dense, med brown, dry.	SP	Silty sand poorly graded, loose, med brown, dry.  Note: The absence of any pebbles suggest this is all wind blown dust (dune)
BGS-A2-47	Generally, relatively homogeneous silty sand top to bottom w/no gravel or pebbles, med density throughout, plant roots to 3' bgs.	SP	Silty fine sand, poorly graded, med dense, med brown, dry.	SP	Silty fine sand, poorly graded, med dense, med brown, dry.
BGS-A2-48	Well graded sandy gravel (¼" to ½") decomposed granite, very dry and dusty.	GW	Well graded sandy gravel, decomposed granite.	GW	Same generally, small gravel (¼" to ½") but some larger pieces 2-3", No significant caliche.
BGS-A2-49	Loose sandy gravel, well graded, narrow caliche zone (6" wide) at 24-30" bgs.	GW	Loose sandy gravel w/gravel ¼-1/2", well graded, med brown	GW	Loose sandy gravel w/some caliche at 24-30", coarse gravel up to 3"
BGS-A2-50	Loose sandy gravel w/several large granite boulders (+18") which are weathered and decomposing (the backhoe cut it in half). Some caliche at 18-36" bgs, not distinct but appears focused around granite boulders.	GW	Loose sandy gravel, well graded w/gravel ¼-1/2" of granite, med brown	GW	Loose sandy gravel w/gravel up to 3" dia. and crystals of quartz and feldspar from decomposed granite. Did not sample granite boulder that is shown in photo, collected from area that had more organic soil.
BGS-A2-51	Coarse, loose gravel 1-4" dia., not much sand or other fines. Caliche zone at 10-16" bgs and some caliche in matrix to 36" bgs. Gravel is primarily granodiorite and granite.	GW	Coarse gravel in some sand, gravel to 4", med brown w/some calcite coating on rocks.	GW	Coarse gravel w/some silty sand in matrix gravel ~80%. Calcite coating on rocks



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BGS-A2-52	Generally, well graded sand top to bottom, with trace small gravel. Plant roots to 10".	SW	Well graded silty to coarse sand with trace angular pebbles, loose, med brown, dry.	SW	Well graded silty to coarse sand with trace angular pebbles, loose, med brown, dry.
BGS-A2-53	Very rocky w/ a lot of caliche at 2-3' bgs. Location is close to rocky hill and bedrock is probably not deep here. Rock/gravel is dark volcanic material.	GW	Very well graded silt-sand-gravel. Loose, some caliche, med brown.	GW	Coarse gravel, rocky starting at ~ 20" w/abundant caliche filling matrix around rocks. >80% rocks and decomposed granite.
BGS-A2-54	Rocky, coarse gravel w/intrusive and volcanic rocks. Loose very well graded sandy gravel, med brown. Some caliche at 36-38" bgs.	GW	Well graded sandy gravel w/gravel to 2" dia.	GW	Well graded coarse gravel to 4" dia. in sandy matrix. Minor caliche near bottom of interval. Gravel consists of intrusive and volcanic rocks.
BGS-A2-55	VERY ROCKY-not really any true soil to sample but there is some fine material and caliche along fracture and root zones. The area is basically decomposing/weathered bed rock of metamorphic origin. Gray fine grained rock of probable volcanic/ intrusive origin but grain structure is altered.	GW	Weathered bedrock w/some caliche and organics in root zone. ~ 95% rock. Sample tried to minimize large rocks and collected caliche areas.	GW	Less weathering and fractured rock w/some caliche areas.
BGS-A2-56	Sandy gravel w/large pieces of decomposing granite. 0-12" bgs-well graded sand w/little-no gravel, well cemented, med hard; >12" bgs is gravel in sand matrix, gravel generally ¼" to ½" w/some large pieces to 3-4" dia. Weak caliche zone at 24-36" bgs	SW	Well graded sand, cemented/compacted, med hard, little or no gravel, brown-reddish brown	GW	Gravel (1/4" to 3") in silty sand caliche matrix. Loose, large pieces of decomposing granite
BGS-A2-57	Sandy soil w/ fine gravel to ¼", soft and loose near surface, well cemented, strong caliche zone at 24-36" bgs.	SW	Well graded sand and gravel (<1/4"), uncemented, loose, med brown.	SW	Well cemented caliche zone in well graded sand and gravel (<1"). Gravel is intrusive granite/granodiorite.
BGS-A2-58	Dense compacted soil to 24" bgs, caliche at 24-30" bgs, loose sandy soil 24-36" bgs. Location near top of alluvial fan (not in drainage).	SW	Dense compacted silty sandy soil. Med graded, some moisture holding soil together, reddish brown.	SW	Loose sandy soil, same composition as shallow sample but not cemented. Caliche layer visible at 24-30", white caliche replacement of roots, little or no gravel.

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BGS-A2-59	Location ~30' from drainage channel w/ several prospect pits and small mine dumps ~400-600' upstream.  Soil very gravelly w/some large rocks up to 24" dia. Bedrock outcrop on opposite side of channel ~50' to the south.	GP	Poorly graded gravel in silty sand matrix. Gravel is angular ¼ to 3" dia. intrusive granodiorite rock, some roots.	GP	Same as shallow. Poorly graded gravel in silty sand, coarse gravel to 3".
BGS-A2-60	Loose sandy gravel, no distinct caliche layer, not very cemented/compacted.	SW	Loose sandy gravel (<1"), well graded, med brown, numerous roots. Soil very dry.	SW	Same as shallow. Larger gravel up to 3-4" dia., some calcium coating on rocks but no distinct caliche zone visible at 3' depth.
BGS-A2-61	Generally, sand and gravel mixture w/increasing angular gravel at depth, plant roots to 30" bgs.	SP	Poorly graded silty sand w/trace angular (10%) from ½-1", loose, light brown, dry.	GW	Well graded angular gravel from ½-1.5" w/pebbles and some fine sand (10%), loose, gray/white/black-gray rock, dry.
BGS-A2-62	Generally, sand and gravel mixture from 10" to 3' bgs w/increasing gravel at depth, plant roots to 2.5' bgs.	SP	Poorly graded silty sand w/trace angular gravel to ½" (5%), med dense, med brown, dry.	GW	Well graded fine to coarse sand (30%) w/pebbles and angular gravel (70%) from ½ to 1", loose, brown, dry.
BGS-A2-63	Generally, sand w/some gravel from 0-2', sand w/light caliche from 2-3' and soft sand from 3-3.5'. Plant roots to 20" bgs.	SP	Poorly graded silty sand w/trace gravel (5%) angular to ¾", med-dense, med brown, dry.	SP	Poorly graded silty sand w/trace angular gravel (10%), ½-4" dia, loose, med brown, dry.
BGS-A2-64	Generally, sand and gravel mixture from 0-2" bgs w/angular gravel, hard caliche layer from 2-3' bgs, large angular gravel from 3-3.5' bgs, plant roots to 12" bgs.	SP	Silty to fine sand w/angular gravel 1-3" dia (20%), dense, med brown, dry.	GW	Angular gravel 1-5" dia w/well graded fine to coarse sand (50/50), loose, med brown, dry.
BGA-A2-65	Location ~ 75-100' downhill from water tanks. Area is disturbed and surface vegetation has been cleared but excavation revealed native soil w/ "A" horizon and organic roots showing to ~10-12" bgs w/ coarse gravel underneath. Collected sample even though surface was disturbed.	GW	Sandy gravel mod-well graded, organics, reddish brown soil color, gravel to 3" dia. of intrusive granite/granodiorite source.	GP	Coarse gravel (80-90%) up to 4-6", slightly rounded, granite. Silty sand matrix. Some calcite coating on rocks but no distinct caliche zone.

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BGS-A2-66	Location relocate ~50-100' north to avoid area disturbed by gravel pit. Coarse gravel up to 4-6" dia. sub-rounded. No distinct caliche horizon but there is some calcite coating on gravel.	GW	Well graded silty sand and gravel w/minor roots and organics. Weak-mod cemented, med-darker brown.	GP	Poorly graded coarse gravel in silty sand matrix w/caliche in matrix and coating on rocks. Gravel 4-6" dia. (80%).
BGS-A2-67	Coarse gravel (70-80%) up to 4" dia. Caliche in matrix at 16-36" bgs.	GW	Well graded silt-sand-gravel.	GW	Coarse gravel ½ to 4" dia. of granite/ grandiorite in caliche sandy matrix.
BGS-A2-68	Very loose and soft, very well graded silty sand and gravel, granite/ grandiorite rocks w/caliche coating. 0-10" bgs w/less gravel still well graded, smaller gravel to ½" dia.	SW	Well graded silty sand w/small gravel (~30%) to ½" dia.	GW	Med-crs gravel (~60%) to 3-4 sub angular, grandiorite in silty sand matrix. Very soft and loose. Caliche coating but not much in matrix.
BGS-A2-69	Loose mod graded sand w/minor gravel to ¼-1/2" dia. Gravel lens w/small gravel <1" dia. at 33" bgs. Different looking than other nearby samples because no coarse gravel. Location in bottom of shallow, wide drainage.	SW	Mod graded silty sand w/fine-crs sand w/little-no gravel. V. loose, uncemented, no caliche.	SW	Mod graded sand w/some fine gravel (20-30%) to 1/2" Minor caliche in matrix and on rocks but no distinct caliche horizon.
BGS-A2-70	Excavate pit at location marked by stake but the pit was solid bedrock. Backfilled and relocated to nearby area off of hill and it was also very rocky and unable to sample. Backfilled and relocated further uphill ~150' west of original stake. Shallow soils (0-8" bgs) silty sand w/minor gravel ¼-1/2"; 8-26" bgs -mod cemented silty sand w/gravel and decomposing boulders; 26" bgs -narrow band of very dark iron stained band in soil and rock, not sure of origin; deep soils (26-36" bgs) strong caliche zone/w abundant calcium in matrix and on rock. Gravel and decomposing bedrock not transported far from source.	SW	Silty sand w/some gravel. Orange-brown.	GW	Gravel and decomposing bedrock (70%) in strong caliche matrix/ Fe band crossed middle of sample zone.

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BGS-A2-71	Loose sandy gravel. Relocated ~150' west to remain on BLM land, west of fence line	SW	Silty sand w/ little-no gravel. Mod graded sand fine to coarse.	SW	Very well graded silty sand w/gravel (~30%). Loose uncemented. Minor caliche on gravel, small caliche horizon visible starting at 36" bgs.
BGS-A2-72	silty, sandy gravel w/horizontal zoning and numerous roots and organics. strong caliche zone at 30-36" bgs.	SW	Silty sand w/gravel rich organic, dk brown-red brown weakly cemented	GW	Coarse gravel 80% up to 5", decomposing granite some strong caliche in bottom at 30"
BGS-A2-73	0-14" bgs - organic rich silty sand med-dk brown. >14" bgs -coarse gravel w/some caliche coating but not significant in matrix.	SW	Mod-well graded silty sand, weakly cemented, some white caliche along roots.	GW	Coarse gravel (~ 75-80%) up to 4", granite/diorite
BGS-A2-74	> 8" bgs -coarse gravel w/large cobbles and boulders to 12" dia. including decomposing granite and granodiorite	SW	Mod-well graded sand w/some gravel to 2" dia, mod cemented, reddish brown.	GW	Coarse gravel, cobbles, and boulders (12" dia.) in sandy matrix, caliche in matrix.

**Appendix C-2**  
**SCS Soil Description**

## **121—Appian loamy sand**

### **Map Unit Setting**

- *Elevation:* 3,900 to 4,800 feet
- *Mean annual precipitation:* 4 to 6 inches
- *Mean annual air temperature:* 49 to 51 degrees F
- *Frost-free period:* 100 to 130 days

### **Map Unit Composition**

- *Appian and similar soils:* 90 percent

### **Description of Appian**

#### **Setting**

- *Landform:* Lake terraces
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Parent material:* Mixed alluvium over lacustrine deposits

#### **Properties and qualities**

- *Slope:* 0 to 2 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.57 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 10 percent
- *Gypsum, maximum content:* 2 percent
- *Maximum salinity:* Nonsaline to slightly saline (0.0 to 8.0 mmhos/cm)
- *Sodium adsorption ratio, maximum:* 90.0
- *Available water capacity:* Low (about 4.6 inches)

#### **Interpretive groups**

- *Land capability classification (irrigated):* 3s
- *Land capability (nonirrigated):* 7s
- *Ecological site:* DRY FLOODPLAIN 8-10 P.Z. (R026XY012NV)

#### **Typical profile**

- *0 to 8 inches:* Loamy sand
- *8 to 18 inches:* Sandy clay loam
- *18 to 60 inches:* Sand

**121—Applan loamy sand.** This very deep, well drained soil is on lake terraces. It formed in loamy alluvium over lacustrine sediment derived from various kinds of rock. Slope is 0 to 2 percent. Elevation is 3,900 to 4,800 feet. The average annual precipitation is about 5 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 100 to 130 days.

Typically, the surface layer is light brownish gray loamy sand about 8 inches thick. The subsoil is brown sandy

clay loam about 10 inches thick. The substratum to a depth of 60 inches or more is light brownish gray sand that has mottles. In some areas the substratum contains layers and lenses of silty material.

Included in this unit are about 5 percent Isolde soils on stabilized dunes (range site 27-23), 3 percent Wabuska soils in shallow depressional areas (range site 27-6), and 2 percent Orizaba soils along abandoned stream channels (range site 26-12). Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Applan soil is moderately slow. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is slightly salt- and alkali-affected to a depth of 18 inches.

Most areas of this unit are used for livestock grazing. A few areas are used for irrigated cultivated crops.

The potential plant community on this unit is mainly black greasewood, basin big sagebrush, and basin wildrye. The present vegetation in most areas is mainly black greasewood, rabbitbrush, basin big sagebrush, and bottlebrush squirreltail. The production of forage is limited by the low average annual precipitation. The suitability of this unit for rangeland seeding is very poor. The main limitations are the low average annual precipitation and the very low available water capacity of the surface layer. Livestock grazing should be managed to protect this unit from blowing and drifting sand.

If this unit is used for irrigated cultivated crops, the main limitations are the slightly saline and alkali surface layer and subsoil. Furrow, border, corrugation, and sprinkler irrigation systems are suited to the unit. For the efficient application and removal of irrigation water, leveling is needed in sloping areas. Cuts required for leveling should not extend into the sandy substratum. The content of salts and alkali can be reduced by using soil amendments such as gypsum, by leaching, and by carefully applying irrigation water. Subsoiling increases the water intake rate and allows salts to be leached downward.

Roads can easily be constructed and maintained on this unit.

This map unit is in capability subclasses IIIs, irrigated, and VIIs, nonirrigated. It is in range site 26-12.

## **232—Delp-Orizaba complex, 0 to 15 percent slopes**

### **Map Unit Setting**

- *Elevation:* 4,450 to 4,600 feet
- *Mean annual precipitation:* 4 to 6 inches
- *Mean annual air temperature:* 49 to 51 degrees F
- *Frost-free period:* 100 to 130 days

### **Map Unit Composition**

- *Delp and similar soils:* 60 percent
- *Orizaba and similar soils:* 30 percent

### **Description of Delp**

#### **Setting**

- *Landform:* Dunes
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Eolian deposits derived from granite

#### **Properties and qualities**

- *Slope:* 0 to 15 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Maximum salinity:* Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
- *Sodium adsorption ratio, maximum:* 30.0
- *Available water capacity:* Low (about 5.6 inches)

#### **Interpretive groups**

- *Land capability classification (irrigated):* 3e
- *Land capability (nonirrigated):* 7s
- *Ecological site:* SODIC DUNES (R027XY016NV)
- *Other vegetative classification:* SODIC DUNES (027XY016NV\_3)

#### **Typical profile**

- *0 to 5 inches:* Fine sand
- *5 to 19 inches:* Stratified loamy sand to sandy loam
- *19 to 60 inches:* Stratified sand to loamy fine sand

### **Description of Orizaba**

#### **Setting**

- *Landform:* Lake plains
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Parent material:* Mixed alluvium

#### **Properties and qualities**

- *Slope:* 0 to 2 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Somewhat poorly drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.57 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* Rare
- *Frequency of ponding:* None



- *Calcium carbonate, maximum content:* 5 percent
- *Maximum salinity:* Very slightly saline to moderately saline (4.0 to 16.0 mmhos/cm)
- *Sodium adsorption ratio, maximum:* 40.0
- *Available water capacity:* High (about 11.3 inches)

#### **Interpretive groups**

- *Land capability classification (irrigated):* 3s
- *Land capability (nonirrigated):* 7s
- *Ecological site:* SODIC TERRACE (R027XY024NV)
- *Other vegetative classification:* SODIC TERRACE (027XY024NV\_1)

#### **Typical profile**

- *0 to 3 inches:* Loam
- *3 to 60 inches:* Stratified sand to silty clay loam

**232—Delp-Orizaba complex, 0 to 15 percent slopes.** This map unit is on stabilized dunes and lake plains. Elevation is 4,450 to 4,600 feet. The average annual precipitation is about 5 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 100 to 130 days.

This unit is 60 percent Delp fine sand that has slopes of 0 to 15 percent and 30 percent Orizaba loam, drained, that has slopes of 0 to 2 percent. The Delp soil is on stabilized dunes, and the Orizaba soil is in interdune areas comprising old lake plains.

Included in this unit are about 5 percent Wabuska soils on old lake plains (range site 27-6) and 5 percent Isolde soils on back slopes of dunes (range site 27-16). Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Delp soil is very deep and well drained. It formed in wind-deposited arkosic sand derived from granitic rock. Typically, the surface layer is light gray fine sand about 5 inches thick. The subsoil is pale brown, stratified sandy loam and loamy sand about 14 inches thick. The substratum to a depth of 60 inches or more is stratified sand and loamy fine sand.

Permeability of this Delp soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is high.

The Orizaba soil is very deep and somewhat poorly drained. It formed in alluvial and lacustrine deposits derived dominantly from various kinds of rock. Typically, the surface layer is grayish brown loam about 3 inches thick. The underlying material to a depth of 60 inches or more is mottled, very pale brown silty clay loam that has strata of loam and silt loam.

Permeability of this Orizaba soil is moderately slow. Available water capacity is high. A seasonal high water table is at a depth of 72 inches or more in most months. Runoff is very slow or ponded, and the hazard of water erosion is slight. The hazard of soil blowing is slight. This soil is subject to flooding during prolonged, high-intensity storms. Channeling and deposition are common along streambanks. The soil is slightly salt- and alkali-affected in the surface layer, and it is slightly or moderately salt- and alkali-affected below.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Delp soil is mainly Indian ricegrass, needleandthread, black greasewood, and hairy horsebrush. The present vegetation in most areas is mainly Bailey greasewood, black greasewood, shadscale, and Indian ricegrass. The production of forage is limited by the low average annual precipitation. The suitability of this soil for rangeland seeding is very poor. The main limitations are the low average annual precipitation and the fine sandy texture of the surface layer.

The potential plant community on the Orizaba soil is mainly black greasewood, Bailey greasewood, shadscale, and Indian ricegrass. The present vegetation in most areas is mainly Bailey greasewood, black greasewood, shadscale, and Indian ricegrass. The production of forage is limited by the low average annual precipitation. The suitability of this soil for rangeland seeding is very poor. The main limitations are the low average annual precipitation and the slightly saline and alkali condition of the soil.

Livestock grazing should be managed to protect this unit from blowing and drifting sand.

When the Delp soil is dry, roads are difficult to maintain because of the presence of loose sand. This results in poor traction and an increased risk of soil blowing. The Orizaba soil is limited for roads because of

low load-bearing capacity. Roads should be provided with a stable base and an adequate wearing surface.

This map unit is in capability subclass VIIc, nonirrigated. The Delp soil is in range site 26-16, and the Orizaba soil is in range site 27-24.

## **484—Orizaba silty clay loam**

### **Map Unit Setting**

- *Elevation:* 4,200 to 5,000 feet
- *Mean annual precipitation:* 4 to 6 inches
- *Mean annual air temperature:* 49 to 51 degrees F
- *Frost-free period:* 100 to 120 days

### **Map Unit Composition**

- *Orizaba and similar soils:* 90 percent

### **Description of Orizaba**

#### **Setting**

- *Landform:* Alluvial flats
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Parent material:* Mixed alluvium

#### **Properties and qualities**

- *Slope:* 0 to 2 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Somewhat poorly drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* About 30 to 42 inches
- *Frequency of flooding:* Rare
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Maximum salinity:* Slightly saline to moderately saline (8.0 to 16.0 mmhos/cm)
- *Sodium adsorption ratio, maximum:* 40.0
- *Available water capacity:* High (about 11.4 inches)

#### **Interpretive groups**

- *Land capability classification (irrigated):* 3w
- *Land capability (nonirrigated):* 7w
- *Ecological site:* DRY FLOODPLAIN 8-10 P.Z. (R026XY012NV)

#### **Typical profile**

- *0 to 3 inches:* Silty clay loam
- *3 to 60 inches:* Stratified sand to silty clay loam

**484—Orizaba silty clay loam.** This very deep, somewhat poorly drained soil is on alluvial flats. It formed in alluvial and lacustrine material derived dominantly from basic igneous and granitic rocks. Slope is 0 to 2 percent. Elevation is 4,200 to 5,000 feet. The average annual precipitation is about 5 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 100 to 120 days.

Typically, the surface layer is light brownish gray silty clay loam about 3 inches thick. The underlying material to a depth of 60 inches or more is dominantly light brownish gray, mottled silty clay loam stratified with loam and silt loam.

Included in this unit is about 10 percent Pizene soils on alluvial fans (range site 26-12).

Permeability of this Orizaba soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Effective rooting depth is limited by a seasonal high water table that is at a depth of 2.5 to 3.5 feet from November through May. Runoff is slow or ponded, and the hazard of water erosion is slight. The hazard of soil blowing is slight. The soil is subject to flooding during prolonged, high-intensity storms. Channeling and deposition are common along streambanks. This soil is moderately salt- and alkali-affected in the surface layer, and it is less salt- and alkali-affected below the surface layer.

The potential plant community on this unit is mainly inland saltgrass, black greasewood, alkali sacaton, and creeping wildrye. The present vegetation in most areas is mainly pickleweed, seepweed, fourwing saltbush, and inland saltgrass. The production of forage is limited by the low average annual precipitation and the high content of salts and alkali. The water table provides supplemental moisture for plants. The suitability of this unit for rangeland seeding is very poor. The main limitations are the content of salts and alkali and the low average annual precipitation. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

This unit is limited for roads because of the hazard of frost heaving. Local roads and streets may require a special base to avoid frost heave damage.

This map unit is in capability subclass VIIw, nonirrigated, and in range site 27-5.

## **511—Patna fine sand, 4 to 15 percent slopes**

### **Map Unit Setting**

- *Elevation:* 4,200 to 6,000 feet
- *Mean annual precipitation:* 4 to 6 inches
- *Mean annual air temperature:* 49 to 51 degrees F
- *Frost-free period:* 100 to 120 days

### **Map Unit Composition**

- *Patna and similar soils:* 90 percent

### **Description of Patna**

#### **Setting**

- *Landform:* Dunes
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Eolian deposits over lacustrine deposits

#### **Properties and qualities**

- *Slope:* 4 to 15 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Somewhat excessively drained
- *Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Maximum salinity:* Nonsaline (0.0 to 2.0 mmhos/cm)
- *Available water capacity:* Low (about 5.2 inches)

#### **Interpretive groups**

- *Land capability classification (irrigated):* 4e
- *Land capability (nonirrigated):* 7s
- *Ecological site:* SANDY 5-8 P.Z. (R027XY009NV)

#### **Typical profile**

- *0 to 5 inches:* Fine sand
- *5 to 15 inches:* Fine sandy loam
- *15 to 60 inches:* Sand

**511—Patna fine sand, 4 to 15 percent slopes.** This very deep, somewhat excessively drained soil is on the leeward side of hills and occurs as small dunes. It formed in eolian sand derived from various kinds of rock. Elevation is 4,200 to 6,000 feet. The average annual precipitation is about 5 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 100 to 120 days.

Typically, the surface layer is brown fine sand about 5 inches thick. The subsoil is yellowish brown and brown fine sandy loam about 16 inches thick. The substratum to a depth of 60 inches or more is brown loamy fine sand.

Included in this unit are about 5 percent Theon soils on hillsides (range site 27-9) and 5 percent Malpais soils in drainageways and on associated alluvial fans (range

site 27-18). Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Patna soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly Indian ricegrass, fourwing saltbush, needleandthread, and Bailey greasewood. The present vegetation in most areas is mainly Indian ricegrass, Nevada dalea, hairy horsebrush, and Nevada ephedra. The production of forage is limited by the low average annual precipitation. The suitability of this unit for rangeland seeding is very poor. The main limitations are the low average annual precipitation and the sandy texture of the surface layer. Livestock grazing should be managed to protect the unit from blowing and drifting sand.

This unit is limited for roads because of slope. Cutting and filling are reduced by building roads in the less sloping areas of the unit. Roads should be provided with adequate surface drainage. Erosion can be controlled and maintenance cost reduced by stabilizing areas that have been disturbed. During prolonged dry periods, roads are difficult to maintain because of the presence of loose sand. This results in poor traction and an increased risk of soil blowing.

This map unit is in capability subclass VIIc, nonirrigated, and in range site 27-9.

## **551—Rawe gravelly sandy loam, 4 to 15 percent slopes**

### **Map Unit Setting**

- *Elevation:* 4,400 to 5,000 feet
- *Mean annual precipitation:* 4 to 6 inches
- *Mean annual air temperature:* 50 to 52 degrees F
- *Frost-free period:* 100 to 130 days

### **Map Unit Composition**

- *Rawe and similar soils:* 85 percent

### **Description of Rawe**

#### **Setting**

- *Landform:* Alluvial fans
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Parent material:* Mixed alluvium

#### **Properties and qualities**

- *Slope:* 4 to 15 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 10 percent
- *Maximum salinity:* Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
- *Sodium adsorption ratio, maximum:* 12.0
- *Available water capacity:* Low (about 4.7 inches)

#### **Interpretive groups**

- *Land capability (nonirrigated):* 7s
- *Ecological site:* GRAVELLY LOAM 4-8 P.Z. (R027XY018NV)

#### **Typical profile**

- *0 to 1 inches:* Gravelly sandy loam
- *1 to 10 inches:* Gravelly clay
- *10 to 60 inches:* Stratified extremely gravelly coarse sandy loam to very gravelly sandy loam

**551—Rawe gravelly sandy loam, 4 to 15 percent slopes.** This very deep, well drained soil is on old alluvial fans. It formed in alluvium derived dominantly from basic igneous rock. Elevation is 4,400 to 5,000 feet. The average annual precipitation is about 5 inches, the average annual air temperature is about 51 degrees F, and the average frost-free period is 100 to 130 days.

Typically, the surface layer is light gray gravelly sandy loam about 1 inch thick. The subsoil is brown gravelly clay about 9 inches thick. The substratum to a depth of 60 inches or more averages very gravelly sandy loam that is light brownish gray.

Included in this unit are about 6 percent Lox soils on fans in slightly lower lying areas (range site 27-24), 5 percent Patna soils on stabilized hummocks (range site 27-9), and 4 percent Perazzo soils on alluvial fan remnants (range site 27-18). Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Rawe soil is slow to a depth of 10 inches and moderately rapid below this depth. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly shadscale, Bailey greasewood, Indian ricegrass, and bud sagebrush. The present vegetation in most areas is mainly shadscale, Bailey greasewood, and Indian ricegrass. The production of forage is limited by the low average annual precipitation. The suitability of this unit for rangeland seeding is very poor. The main limitation is the low average annual precipitation.

Cutting and filling are reduced by building roads in the less sloping areas of this unit.



## **553—Rawe-Malpais association**

### **Map Unit Setting**

- *Elevation:* 4,400 to 5,000 feet
- *Mean annual precipitation:* 4 to 6 inches
- *Mean annual air temperature:* 50 to 52 degrees F
- *Frost-free period:* 100 to 130 days

### **Map Unit Composition**

- *Rawe and similar soils:* 60 percent
- *Malpais and similar soils:* 25 percent

### **Description of Rawe**

#### **Setting**

- *Landform:* Fan remnants
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Parent material:* Mixed alluvium

#### **Properties and qualities**

- *Slope:* 2 to 15 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 10 percent
- *Maximum salinity:* Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
- *Sodium adsorption ratio, maximum:* 12.0
- *Available water capacity:* Low (about 4.7 inches)

#### **Interpretive groups**

- *Land capability (nonirrigated):* 7s
- *Ecological site:* GRAVELLY LOAM 4-8 P.Z. (R027XY018NV)

#### **Typical profile**

- *0 to 1 inches:* Gravelly sandy loam
- *1 to 10 inches:* Gravelly clay
- *10 to 60 inches:* Stratified extremely gravelly coarse sandy loam to very gravelly sandy loam

### **Description of Malpais**

#### **Setting**

- *Landform:* Inset fans
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Parent material:* Mixed alluvium

#### **Properties and qualities**

- *Slope:* 2 to 15 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent

- *Maximum salinity:* Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
- *Sodium adsorption ratio, maximum:* 30.0
- *Available water capacity:* Low (about 5.7 inches)

**Interpretive groups**

- *Land capability (nonirrigated):* 7s
- *Ecological site:* GRAVELLY LOAM 4-8 P.Z. (R027XY018NV)

**Typical profile**

- *0 to 3 inches:* Gravelly sandy loam
- *3 to 25 inches:* Very gravelly sandy loam
- *25 to 60 inches:* Extremely cobbly sandy loam

**553—Rawe-Malpais association.** This map unit is on gently sloping to strongly sloping dissected alluvial fans and in associated drainageways. Slope is 2 to 15 percent. Elevation is 4,400 to 5,000 feet. The average annual precipitation is about 5 inches, the average annual air temperature is about 51 degrees F, and the average frost-free period is 100 to 130 days.

This unit is 60 percent Rawe gravelly sandy loam and 25 percent Malpais gravelly sandy loam. The Rawe soil is on remnants of old alluvial fans, and the Malpais soil is in drainageways and on alluvial fan skirts.

Included in this unit are about 6 percent Perazzo soils on alluvial fans (range site 27-18), 5 percent Cleaver soils on alluvial fans (range site 27-18), and 4 percent Patna soils on stabilized low dunes and hummocks. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Rawe soil is very deep and well drained. It formed in alluvium derived dominantly from basic igneous rock. Typically, the surface layer is light gray gravelly sandy loam about 1 inch thick. The subsoil is brown gravelly clay about 9 inches thick. The substratum to a depth of 60 inches or more is light brownish gray very gravelly sandy loam.

Permeability of the Rawe soil is slow to a depth of 10 inches and moderately rapid below this depth. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Malpais soil is very deep and well drained. It formed in alluvium derived from various kinds of rock. Typically, the surface layer is pale brown gravelly sandy loam about 3 inches thick. The underlying material to a depth of 60 inches or more is brown to grayish brown extremely cobbly sandy loam and very gravelly sandy loam.

Permeability of the Malpais soil is moderately rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

This unit is used for livestock grazing and wildlife habitat.

The potential and present plant community on this unit is mainly Indian ricegrass, Bailey greasewood, and shadscale. The production of forage is limited by the low average annual precipitation. The suitability of this unit for rangeland seeding is very poor. The main limitation is the low average annual precipitation.

Cutting and filling are reduced by building roads in the less sloping areas of this unit. Unless an adequate wearing surface is maintained, stones and cobbles in the Malpais soil create road hazards and increase maintenance cost.

This map unit is in capability subclass VIIc, nonirrigated, and in range site 27-18.

## **631—Singatse very gravelly sandy loam, 8 to 15 percent slopes**

### **Map Unit Setting**

- *Elevation:* 4,200 to 6,500 feet
- *Mean annual precipitation:* 4 to 6 inches
- *Mean annual air temperature:* 49 to 51 degrees F
- *Frost-free period:* 100 to 120 days

### **Map Unit Composition**

- *Singatse and similar soils:* 85 percent

### **Description of Singatse**

#### **Setting**

- *Landform:* Hills
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Parent material:* Residuum and colluvium derived from volcanic rocks

#### **Properties and qualities**

- *Slope:* 8 to 15 percent
- *Depth to restrictive feature:* 4 to 10 inches to paralithic bedrock; 8 to 14 inches to lithic bedrock
- *Drainage class:* Somewhat excessively drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 to 0.00 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 10 percent
- *Maximum salinity:* Nonsaline (0.0 to 2.0 mmhos/cm)
- *Sodium adsorption ratio, maximum:* 5.0
- *Available water capacity:* Very low (about 0.4 inches)

#### **Interpretive groups**

- *Land capability (nonirrigated):* 7s
- *Ecological site:* BARREN GRAVELLY SLOPE 4-8 P.Z. (R027XY027NV)

#### **Typical profile**

- *0 to 6 inches:* Very gravelly sandy loam
- *6 to 12 inches:* Bedrock
- *12 to 16 inches:* Bedrock

**631—Singatse very gravelly sandy loam, 8 to 15 percent slopes.** This very shallow, somewhat excessively drained soil is on hillsides and mountains. It formed in residuum and colluvium derived dominantly from andesite and granitic rock. Elevation is 4,200 to 6,500 feet. The average annual precipitation is about 5 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 100 to 120 days.

Typically, the surface layer is light brownish gray very gravelly sandy loam about 6 inches thick. Weathered bedrock is at a depth of about 6 inches. Hard bedrock is at a depth of 12 inches. Depth to weathered bedrock ranges from 4 to 10 inches. Depth to hard bedrock ranges from 10 to 20 inches.

Included in this unit are about 10 percent Theon soils on rounded hilltops and stable side slopes (range site 27-19), 3 percent Malpais soils in drainageways and on associated alluvial fans (range site 27-18), and 2 percent Yerington soils on the leeward side of hills that receive deposits of sandy eolian material (range site 27-9). Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Singatse soil is moderate. Available water capacity is very low. Effective rooting depth is 4 to 10 inches. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly shadscale, Bailey greasewood, and Indian ricegrass. The present vegetation in most areas is mainly Bailey greasewood, shadscale, bottlebrush squirreltail, and spiny hopsage. The production of forage is limited by the low average annual precipitation. The suitability of this unit for rangeland seeding is very poor. The main limitations are the low average annual precipitation and the very low available water capacity.

This unit is limited for roads because of shallow depth to bedrock. Roads should be designed to minimize cuts.

This map unit is in capability subclass VIIc, nonirrigated, and in range site 27-27.

## **651—Theon very gravelly sandy loam, 8 to 30 percent slopes**

### **Map Unit Setting**

- *Elevation:* 4,200 to 6,500 feet
- *Mean annual precipitation:* 4 to 6 inches
- *Mean annual air temperature:* 46 to 52 degrees F
- *Frost-free period:* 100 to 130 days

### **Map Unit Composition**

- *Theon and similar soils:* 85 percent

### **Description of Theon**

#### **Setting**

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Parent material:* Residuum and colluvium derived from volcanic rocks

#### **Properties and qualities**

- *Slope:* 8 to 30 percent
- *Surface area covered with cobbles, stones or boulders:* 1.0 percent
- *Depth to restrictive feature:* 8 to 14 inches to lithic bedrock
- *Drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 to 0.00 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 1 percent
- *Maximum salinity:* Nonsaline (0.0 to 2.0 mmhos/cm)
- *Sodium adsorption ratio, maximum:* 12.0
- *Available water capacity:* Very low (about 0.9 inches)

#### **Interpretive groups**

- *Land capability (nonirrigated):* 7s
- *Ecological site:* STONY SLOPE 4-8 P.Z. (R027XY019NV)

#### **Typical profile**

- *0 to 3 inches:* Very gravelly sandy loam
- *3 to 12 inches:* Very gravelly clay loam
- *12 to 16 inches:* Bedrock

**651—Theon very gravelly sandy loam, 8 to 30 percent slopes.** This shallow and very shallow, well drained soil is on hills and low mountains. It formed in residuum derived dominantly from andesite and rhyolite. Elevation is 4,200 to 6,500 feet. The average annual precipitation is about 5 inches, the average annual air temperature is about 49 degrees F, and the average frost-free period is 100 to 130 days.

Typically, the surface layer is pale brown very gravelly sandy loam about 2 inches thick. The subsoil is brown and reddish brown very gravelly clay loam and very gravelly loam about 9 inches thick. Weathered bedrock is at a depth of 11 inches. Hard bedrock is at a depth of 16 inches. Depth to weathered bedrock ranges from 8 to 14 inches. Depth to hard bedrock ranges from 10 to 20 inches.

Included in this unit are about 5 percent Rock outcrop on ridges and steep side slopes, 5 percent Singatse soils on steep south-facing side slopes (range site 27-27), and 5 percent Olac soils on north-facing side slopes (range site 26-25). Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Theon soil is moderately slow. Available water capacity is very low. Effective rooting depth is 8 to 14 inches. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

This unit is used for livestock grazing.

The potential plant community on this unit is mainly shadscale, Indian ricegrass, desert needlegrass, and Bailey greasewood. The present vegetation in most areas is mainly shadscale, Bailey greasewood, and Indian ricegrass. The production of forage is limited by the low average annual precipitation. The suitability of this unit for rangeland seeding is very poor. The main limitations are the low average annual precipitation and the very low available water capacity.

This unit is limited for roads because of the shallow depth to bedrock and slope in some areas. Roads should be designed to minimize cuts because of the limited depth to bedrock. Cutting and filling are reduced by building roads in the less sloping areas of the unit. Roads should be provided with adequate surface drainage. Erosion can be controlled and maintenance cost reduced by stabilizing areas that have been disturbed.

This map unit is in capability subclass VII, nonirrigated, and in range site 27-19.

## **751—Malpais gravelly loamy sand, 2 to 8 percent slopes**

### **Map Unit Setting**

- *Elevation:* 4,300 to 4,800 feet
- *Mean annual precipitation:* 5 to 7 inches
- *Mean annual air temperature:* 49 to 51 degrees F
- *Frost-free period:* 100 to 120 days

### **Map Unit Composition**

- *Malpais and similar soils:* 90 percent

### **Description of Malpais**

#### **Setting**

- *Landform:* Alluvial fans
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Parent material:* Mixed alluvium

#### **Properties and qualities**

- *Slope:* 2 to 8 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Maximum salinity:* Nonsaline to very slightly saline (0.0 to 4.0 mmhos/cm)
- *Sodium adsorption ratio, maximum:* 30.0
- *Available water capacity:* Low (about 5.7 inches)

#### **Interpretive groups**

- *Land capability (nonirrigated):* 7s
- *Ecological site:* GRAVELLY LOAM 4-8 P.Z. (R027XY018NV)

#### **Typical profile**

- *0 to 3 inches:* Gravelly loamy sand
- *3 to 25 inches:* Very gravelly sandy loam
- *25 to 60 inches:* Extremely cobbly sandy loam



**751—Malpais gravelly loamy sand, 2 to 8 percent slopes.** This very deep, well drained soil is on alluvial fans and along drainageways. It formed in alluvium derived dominantly from mixed rock. Elevation is 4,300 to 4,800 feet. The average annual precipitation is about 5 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 100 to 120 days.

Typically, the surface layer is light brownish gray gravelly loamy sand about 3 inches thick. The subsoil and substratum to a depth of 60 inches or more are pale brown and brown and average very gravelly sandy loam and extremely cobbly sandy loam.

Included in this unit are about 5 percent Perazzo soils on older alluvial fan remnants (range site 27-18) and 5 percent Yerington soils in areas of eolian deposits (range site 27-9). Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Malpais soil is moderately rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on this unit is mainly Indian ricegrass, shadscale, bottlebrush squirreltail, and Bailey greasewood. The present vegetation in most areas is mainly shadscale, Bailey greasewood, Indian ricegrass, and Nevada ephedra. The production of forage is limited by the low average annual precipitation. The suitability of this unit for rangeland seeding is very poor. The main limitation is the low average annual precipitation.

Unless an adequate wearing surface is maintained for roads on this unit, stones and cobbles in the soil create road hazards and increase maintenance cost.

This map unit is in capability subclass VII<sub>s</sub>, nonirrigated, and in range site 27-18.

## **767—Yerington gravelly sandy loam, 4 to 8 percent slopes**

### **Map Unit Setting**

- *Elevation:* 4,400 to 5,000 feet
- *Mean annual precipitation:* 4 to 6 inches
- *Mean annual air temperature:* 49 to 51 degrees F
- *Frost-free period:* 100 to 120 days

### **Map Unit Composition**

- *Yerington and similar soils:* 85 percent

### **Description of Yerington**

#### **Setting**

- *Landform:* Sand sheets
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Parent material:* Eolian deposits

#### **Properties and qualities**

- *Slope:* 4 to 8 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Maximum salinity:* Nonsaline (0.0 to 2.0 mmhos/cm)
- *Sodium adsorption ratio, maximum:* 12.0
- *Available water capacity:* Low (about 5.9 inches)

#### **Interpretive groups**

- *Land capability classification (irrigated):* 3s
- *Land capability (nonirrigated):* 7s
- *Ecological site:* SANDY 5-8 P.Z. (R027XY009NV)

#### **Typical profile**

- *0 to 8 inches:* Gravelly sandy loam
- *8 to 60 inches:* Stratified loamy coarse sand to very fine sandy loam

**767—Yerington gravelly sandy loam, 4 to 8 percent slopes.** This very deep, well drained soil is on alluvial fans. It formed in alluvium derived from various kinds of rock and eolian sand. Elevation is 4,400 to 5,000 feet. The average annual precipitation is about 5 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 100 to 120 days.

Typically, the surface layer is pale brown gravelly sandy loam about 8 inches thick. The underlying material to a depth of 60 inches or more is pale brown, stratified loamy sand and sandy loam and has lenses of gravelly or cobbly material.

Included in this unit are about 10 percent Isolde soils on stabilized dunes and hummocks (range site 27-23) and 5 percent Malpais soils in drainageways (range site 27-18). Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Yerington soil is rapid. Available water capacity is moderate. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

This unit is used mainly for livestock grazing. It is also used for irrigated crops and homesite development.

The potential plant community on this unit is mainly Indian ricegrass, fourwing saltbush, needleandthread, and Bailey greasewood. The present vegetation in most areas is mainly Douglas rabbitbrush, Indian ricegrass, Bailey greasewood, and dalea. The production of forage is limited by the low average annual precipitation. The suitability of this unit for rangeland seeding is very poor. The main limitation is the low average annual precipitation.

If this unit is used for irrigated hay, pasture, and cultivated crops, the main limitations are the moderate available water capacity and slope. The moderately rapid movement of water in the upper part of the soil should be considered when selecting the irrigation method or design. Sprinkler irrigation is the most suitable method of applying water. Because the soil is droughty, applications of irrigation water should be light and frequent. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion.

This unit is well suited to the construction of dwellings.

The main limitation for septic tank absorption fields is inadequate filtration of effluent. Because the substratum is rapidly permeable, special design may be needed to avoid polluting ground water.

Roads can easily be constructed and maintained on this unit.

This map unit is in capability subclasses IIIe, irrigated, and VIIs, nonirrigated. It is in range site 27-9.

## **822—Dumps, mine**

### **Map Unit Composition**

- *Dumps*: 100 percent

### **Description of Dumps**

#### **Setting**

- *Landform*: Alluvial fans
- *Down-slope shape*: Linear
- *Across-slope shape*: Convex

**822—Dumps, mine.** Dumps, mine, consists of large areas of waste rock and overburden from mining operations. Reclamation of Dumps generally is not feasible because of the low average annual precipitation.

## **825—Pits, mine**

### **Map Unit Composition**

- *Pits*: 100 percent

### **Description of Pits**

#### **Setting**

- *Landform*: Hills
- *Down-slope shape*: Linear
- *Across-slope shape*: Convex

**825—Pits, mine.** Pits, mine, consists of large open excavations from which ore-bearing rock has been removed. These excavations support little if any vegetation. Reclamation generally is not feasible.

## **827—Slickens**

### **Map Unit Composition**

- *Slickens*: 100 percent

### **Description of Slickens**

#### **Setting**

- *Landform*: Fan piedmonts
- *Down-slope shape*: Convex
- *Across-slope shape*: Convex

**827—Slickens.** Slickens consists of accumulations of finely ground, chemically treated rock from ore mill operations. These accumulations are barren. They generally are confined to specially constructed basins, but in some places they have flowed over the basins and have been deposited on the surface of some soils.

Resource reference:

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at <http://websoilsurvey.nrcs.usda.gov/> accessed September 2, 2008.